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Revision 0

Pictures of a Suspect-TRU Retrieval

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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Teaser:
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Pictures of a Suspect-TRU Retrieval
byline:By Rodney R. Gadd

Retrieving "suspect" transuranic (TRU) waste from the Hanford Site's low-level waste burial grounds is a tall order, due to conditions that have changed as the work progresses. Project personnel developed several new methods for handling the waste that other retrieval operations may find useful. The Waste Retrieval Project is operated by Fluor Hanford, a prime contractor for the U.S. Department of Energy's Richland Operations Office since 1996.

Suspect TRU
The radioactive waste was buried between 1970 and 1986 at the Hanford Site in southeastern Washington State. The waste is called "suspect TRU" because the definition for transuranic waste was changed before retrieval began. The DOE, in its Order 435.1, currently defines TRU waste as "waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram (more than 100 nCi/g of TRU radionuclides) of waste with half-lives greater than 20 years." The term "transuranic" means those elements with an atomic number higher than that of uranium (i.e., atomic number greater than 92). Consequently, some of the waste initially placed in storage would now be defined as LLW. Since 1970, approximately 37,400 containers of suspect-TRU waste were placed in retrievable storage at Hanford. A regulatory milestone required that the retrieval of contact-handled, retrievably stored suspect-TRU waste in Hanford's 200 Area LLW burial grounds begin by November 15, 2003, and be completed by December 31, 2010. In November 2003, Fluor Hanford's Waste Retrieval Project began retrieval operations and has been continuously retrieving suspect-TRU waste since then. Table I shows the increasing waste volumes that must be retrieved to meet the regulatory commitments.

The Waste Retrieval Project is responsible for removing the waste from four LLW burial grounds in the central plateau of the arid, 586-square-mile Hanford Site. Retrieval consists of removing soil overburden from the waste containers in the trenches; removing the containers; and transferring them to a permitted and compliant treatment, storage, and disposal facility. Figure 1 is a very simplified diagram of the process showing the use of in-trench assay to differentiate between containers of LLW and those containing TRU waste. The TRU waste will be further characterized for disposal at the Waste Isolation Pilot Plant (WIPP) in Carlsbad, N.M.

The buried waste comes from more than 50 different generators, both on- and offsite. While the waste containers are mostly 55-gallon drums, there are also many boxes of various sizes and composition, as well as miscellaneous containers. The boxes are made of concrete, metal, or wood coated with fiberglass-reinforced plastic. The drums are stored in various configurations: stacked vertically four-tiers high, stacked horizontally lying on their sides, and placed at a 45-degree angle in a concrete "V trench."**(Photo N1676644 here.)**

Old-Fashioned Ingenuity

Retrieving the waste containers has presented significant difficulties and required innovations to continue to meet the project's milestones. The problem areas fall into three categories: container identification, container condition/handling, and weather.

Container Identification

Current work is moving into several older trenches that have drums with no unique container identification numbers that can be connected to the burial records. Uncovering unlabeled drums requires additional efforts to identify waste streams, complete waste designations, and comply with nuclear safety and security requirements. Identifying the contents of containers that have no labels likely will require radiography or in-trench assay.

Condition of Containers

The condition of buried drums has ranged from "nearly new" to "heavily corroded and breached." **(Photo PicturesTRURetrieval here.)** Workers have created simple, clever tools and techniques to successfully retrieve the worst drums encountered so far. Drum supports that the workers call "clam shells" (e.g., ¼-drum circumference) are sheet-metal sleeves slipped under or around the deteriorated drums, then taped to the drums to provide sufficient support for the drums to be moved/retrieved. Cranes lift large, heavy boxes onto 20- × 8-foot platforms **(Photo DSCN1489 here)** that provide extra support and facilitate handling by forklifts for assaying in the trench and positioning for shipping. Drums that have liquids are sent to Hanford's T Plant for specialized treatment. **(Photo TPlant here.)**

Weather

Hanford experiences tremendous swings in the weather: below freezing conditions in winter and triple-digit temperatures in summer. These temperature extremes pose extra stresses for workers outdoors in these trenches. Because most retrieval operations are done outdoors, a weather enclosure (**Photo P1010017 here)** and a sunshade **(Photo 100_1165 here)** have been installed to deal with winter moisture and summer heat. Both of the portable structures prevent moisture from accumulating on the drums in winter—moisture that can hamper surveying for radioactive contamination. The structures also offer shade during the summer heat, reducing the potential for heat stress to workers bundled in anticontamination clothing and fitted with powered air-purifying respirators (PAPRs) with protective hoods. Old-fashioned ingenuity and teamwork with the PAPR manufacturer resulted in workers using hydration packs **(Photo P0001955 here)** while wearing the PAPR/protective hoods, helping workers to stay hydrated while retrieving the waste.

Progress to Date

Through April 2007, Fluor Hanford retrieved 5,293 cubic meters of waste coming from 16,397 drums and 253 boxes. The Waste Retrieval Project has sent 2,643 drums to the Hanford TRU Program, which packages, certifies, and ships the waste to WIPP. The Waste Retrieval Project has met all seven regulatory milestones while achieving both Voluntary Protection Program Star status and an outstanding safety record (zero lost workdays, zero restricted workdays and zero "OSHA recordable injuries"—injuries that the Occupational Safety and Health Administration require to be reported). Both the radiation control and industrial hygiene programs contribute to the safety performance and also enhance continued retrieval operations. Control of alpha

contamination is aided by hand foggers that workers use and misters in the shade structure. Windscreens added to the shade structure have resulted in an approximately 50 percent reduction in wind speed behind the screens. The screening allows retrieval to continue during winds up to 18-20 miles per hour while still keeping the wind speed in the retrieval area at or below the required 11 mph. The industrial hygiene program consists of monitoring before personnel enter new trenches/modules and full-time monitoring of retrieval activities in the trenches to ensure worker safety when handling the deteriorated drums. There have been no reportable radiation or chemical exposures to workers.

These excellent results reflect project management's commitment to (1) worker involvement and innovation, (2) sound engineering and work planning to identify hazards and solve new problems, (3) use of proven, commercially available technologies, and (4) extensive use of mockups to select tools/approaches and train personnel. The experiences gained on Fluor Hanford's Waste Retrieval Project for the DOE's Richland Operations Office will be beneficial for many future buried waste retrieval projects around the world.

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Figure and photo captions

Table 1 Volume Commitments

Suspect-TRU Waste Volume Commitments (m^3)		
CY	Cumulative	Annual
2004	1,200	1,200
2005	2,700	1,500
2006	4,700	2,000
2007	7,200	2,500
2008	9,700	2,500
2009	12,200	2,500
2010	15,052	2,852

Fig. 1. Retrieval process separates out LLW to ensure only TRU waste is sent to WIPP.

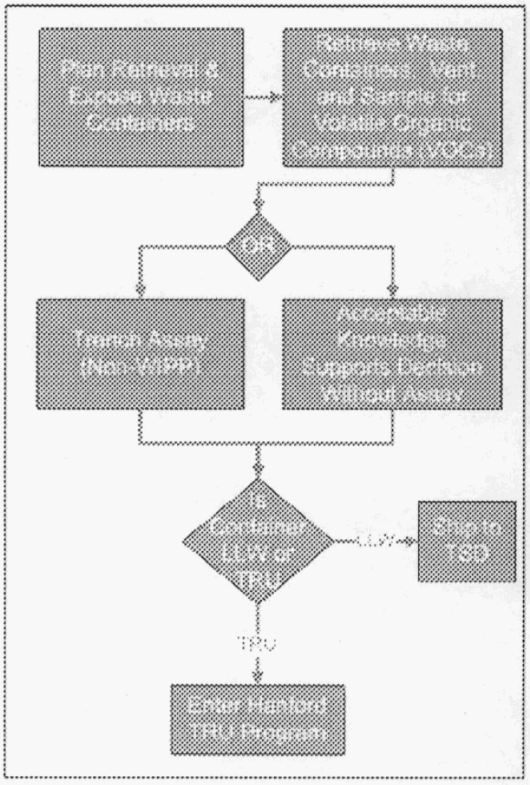


Photo N1676644
Drums were placed in "V" trenches in some waste burial grounds at the U.S. Department of Energy's Hanford Site in 1972-1973.

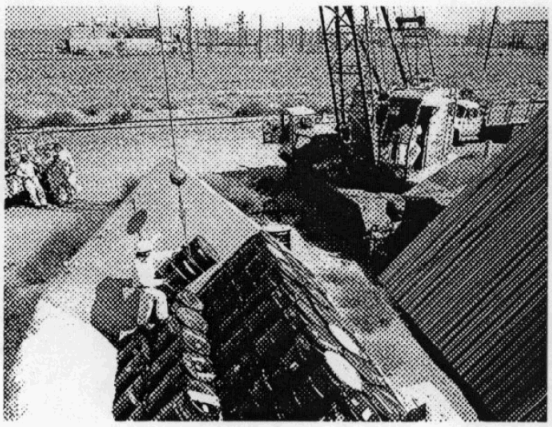


Photo P1010017
The weather enclosure, which moves along the trench on motorized tracks, provides sufficient access for retrieval equipment and workers. Smoke testing is being performed to define air movement patterns for placing air monitors.

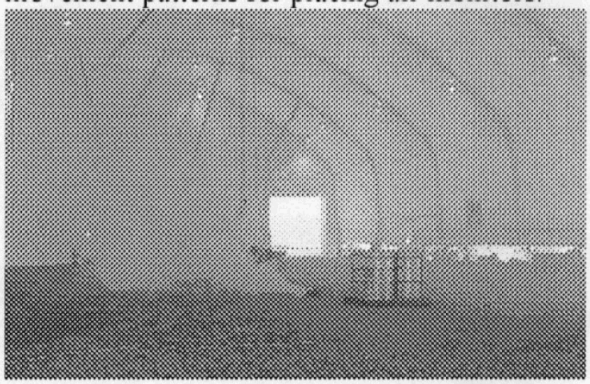


Photo 100_1165
Operators work in powered air-purifying respirators (PAPRs) under the sunshade and benefit from the cooling water mist. The mist also helps control contamination.

Photo P0001955
A nuclear chemical operator demonstrates the use of the hydration pack under a PAPR hood.

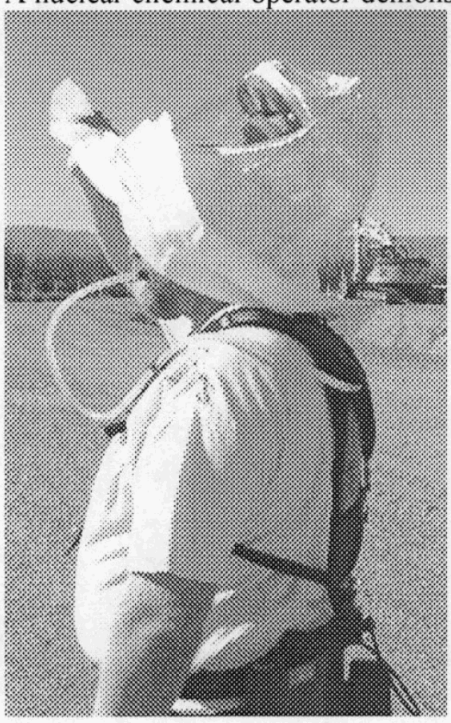


Photo PicturesTRURetrieval
Handling drums of waste that are in good condition is easy compared to the extra effort required to successfully retrieve corroded and/or breached drums. This is one of the worst.

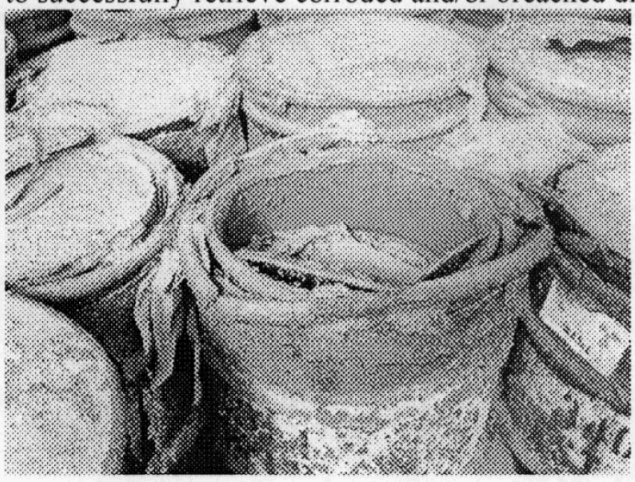
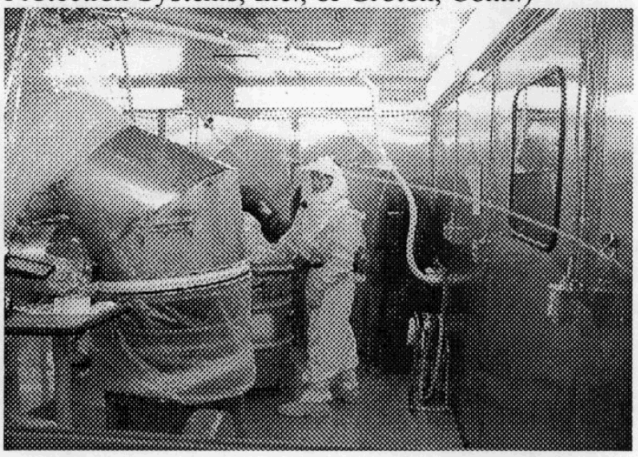


Photo DSCN1489
Platforms are used to facilitate moving large boxes of waste with forklifts.

Photo TPlant
Retrieved drums of waste found to contain liquids are processed at T Plant in a Perma-Con® Modular Panel Containment System. (Perma-Con is a registered trademark of NFS-Radiation Protection Systems, Inc., of Groton, Conn.)



Possible pull-quotes:
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